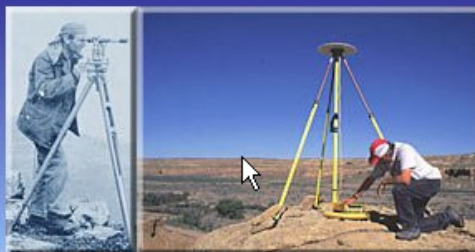
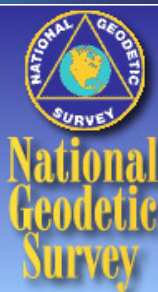


National Geodetic Survey – a Geodetic Update



NGS, Positioning America for the Future

U.S. Department
of Commerce

National Oceanic and
Atmospheric Administration
National
Ocean Service



William Stone

National Geodetic Survey

william.stone@noaa.gov ~ 505-277-3622 x252

Presentation Topics

NATIONAL GEODETIC SURVEY

- Continuously Operating Reference Stations
- Online Positioning User Service
- NAD83 2007 Readjustment
- Height Modernization Program
- Grav-D Project
- NGS 10 Year Plan

www.ngs.noaa.gov

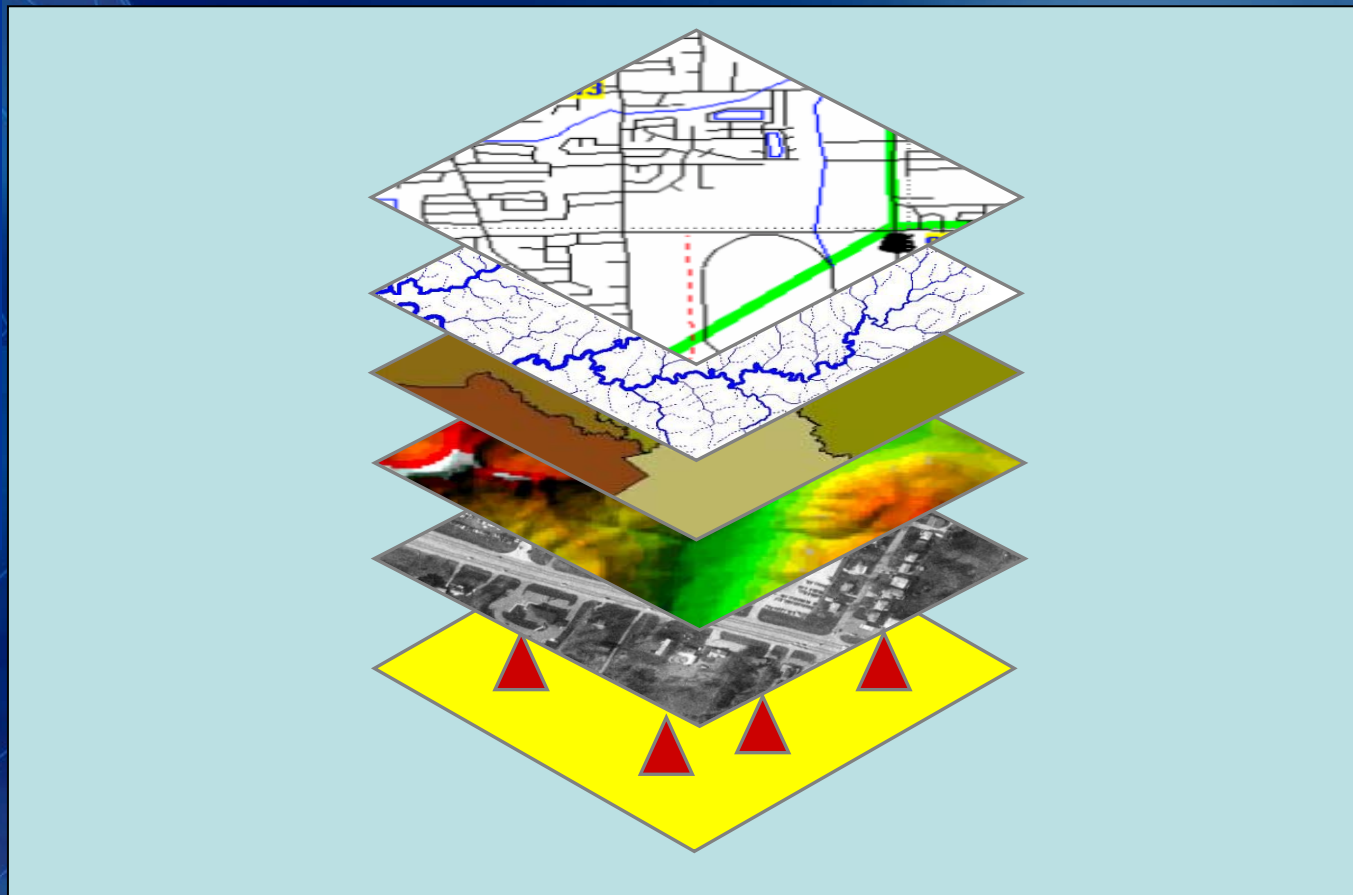


National Oceanic and Atmospheric Administration

National Spatial Reference System (NSRS)

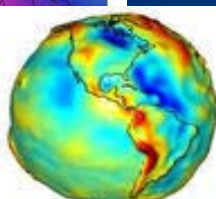
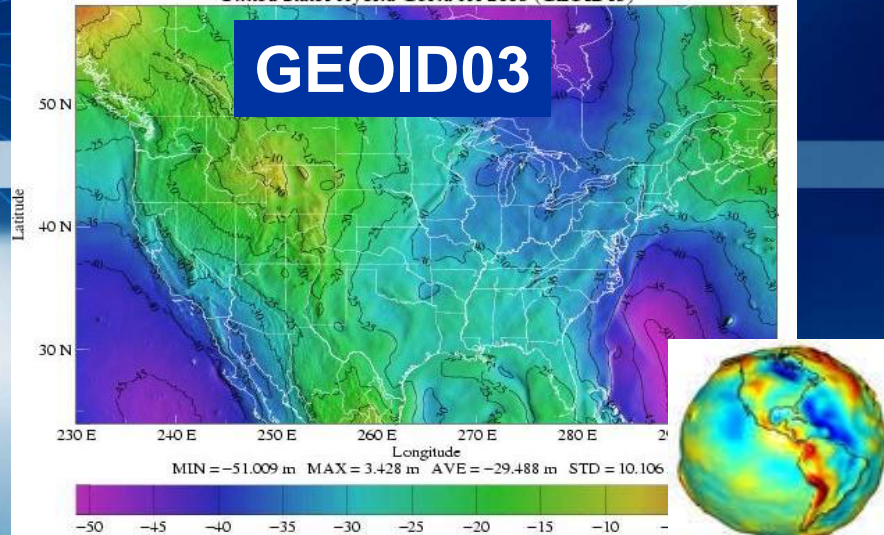
NATIONAL GEODETIC SURVEY

- Latitude
- Longitude
- Height
- Scale
- Gravity
- Orientation

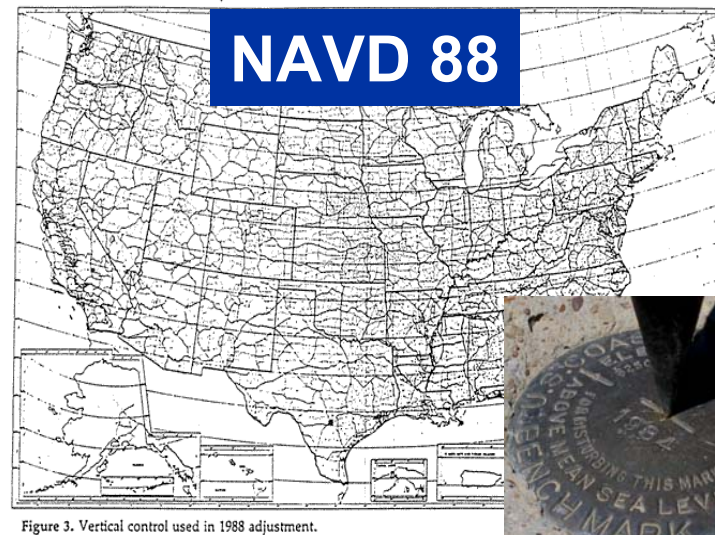


National Oceanic and Atmospheric Administration

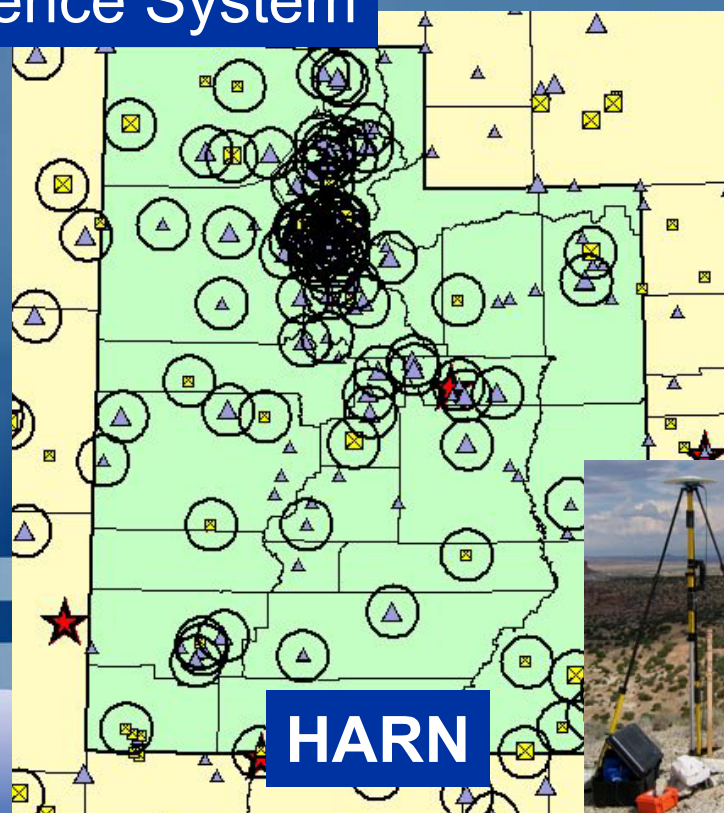
GEOID03



NAVD 88



National Spatial Reference System

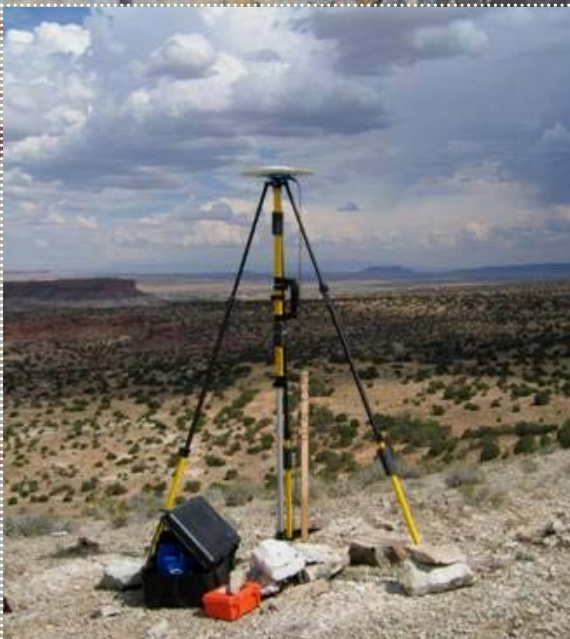




36 33 42.15986 N 105 12 15.67754 W

1855.973 m

(NAD83/NAVD88)



36 33 42.15986 N 105 12 15.67754 W
ellipsoid ht. 1857.765 m
orthometric ht. 1876.145 m
(NAD83(NSRS2007)/NAVD88)

SNR is mapped to RINEX snr flag value [0-9]
 L1 & L2: min(max(int(snr_dBHz/6), 0), 9)
 teqc windowed: start @ 2006 Jan 28 00:00:00.000
 teqc windowed: end @ 2006 Jan 28 01:00:00.000
 P028

Michael Jackson UNAVCO/PBO
 4527253325 TRIMBLE NETRS 1.2-2
 0220354834 TRM29659.00 SCIT
 -1588370.3193 -4915222.8951 3732172.5255
 0.0083 0.0000 0.0000

1	1							
7	L1	L2	C1	P2	P1	S1	S2	
15.0000								
teqc windowed: start @ 2006 Jan 28 00:00:00.000								
teqc windowed: end @ 2006 Jan 28 01:00:00.000								
2006	1	28	0	0	0.0000000	GPS		

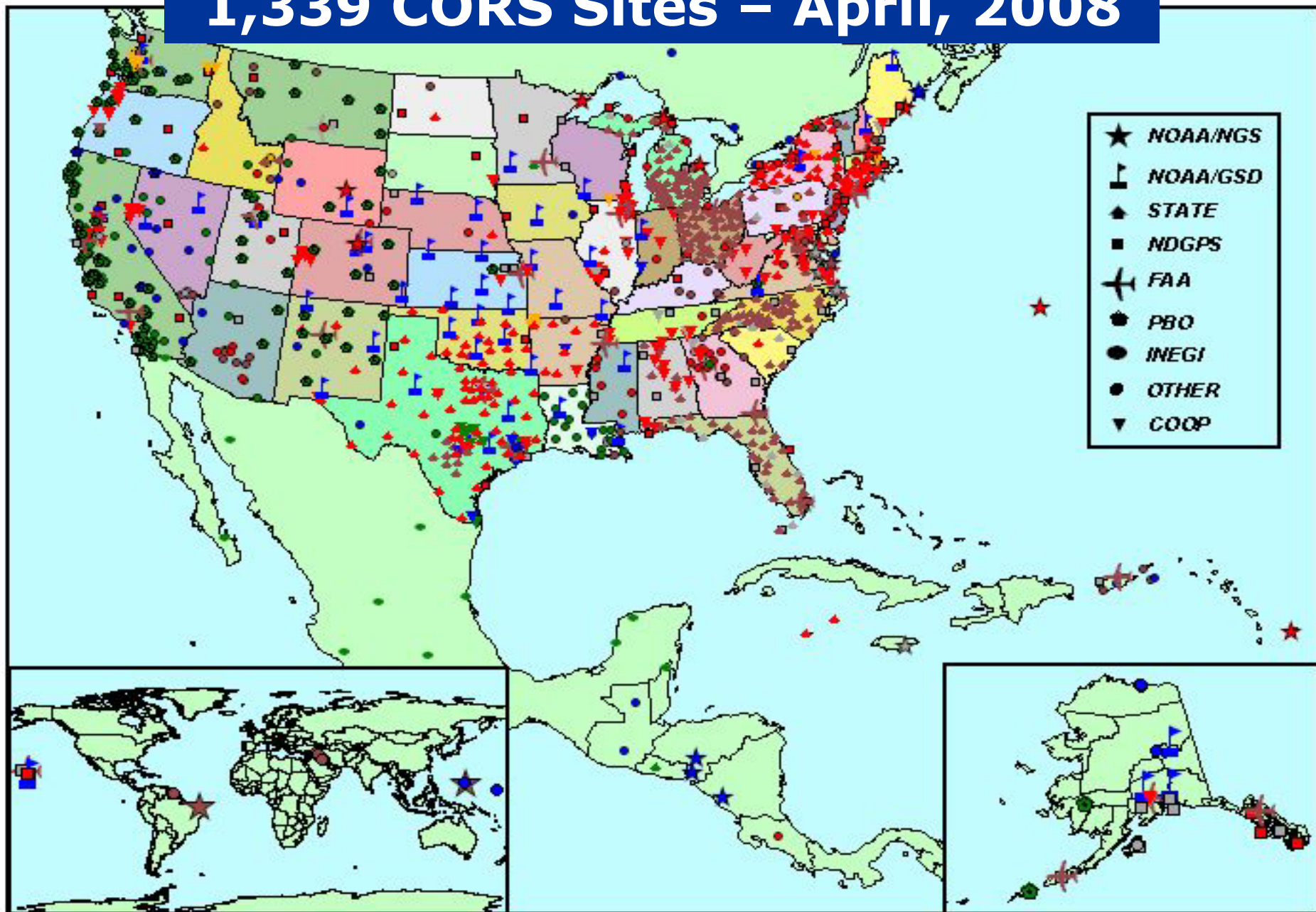
06	1	28	0	0	0.0000000	0	10G	6G16G	3G26G29G18G21G10G15G22
-23209134.08248	-17971579.98947	21184126.6724	21184116.6884						
51.2504	43.5004								
-9636384.47746	-7483886.87744	24126248.2894	24126238.1884						
41.5004	27.2504								
-3337843.69746	-2042613.35343	25062422.9144	25062413.4574						
40.2504	21.7504								

COMMENT
 COMMENT
 COMMENT
 COMMENT
 MARKER NAME
 OBSERVER / AGENCY
 REC # / TYPE / VERS
 ANT # / TYPE
 APPROX POSITION XYZ
 ANTENNA: DELTA H/E/N
 WAVELENGTH FACT L1/2
 # / TYPES OF OBSERV
 INTERVAL
 COMMENT
 COMMENT
 TIME OF FIRST OBS
 END OF HEADER

Continuously Operating Reference Stations (CORS)



1,339 CORS Sites – April, 2008



UNAVCO-PBO

P009
P012
P057
P086
P089
P105
P121
P122
RBUT

FAA

ZLC1

USCG

MYT1

NOAA-GSD

SLCU

Salt Lake County

MIDV

Carbon County

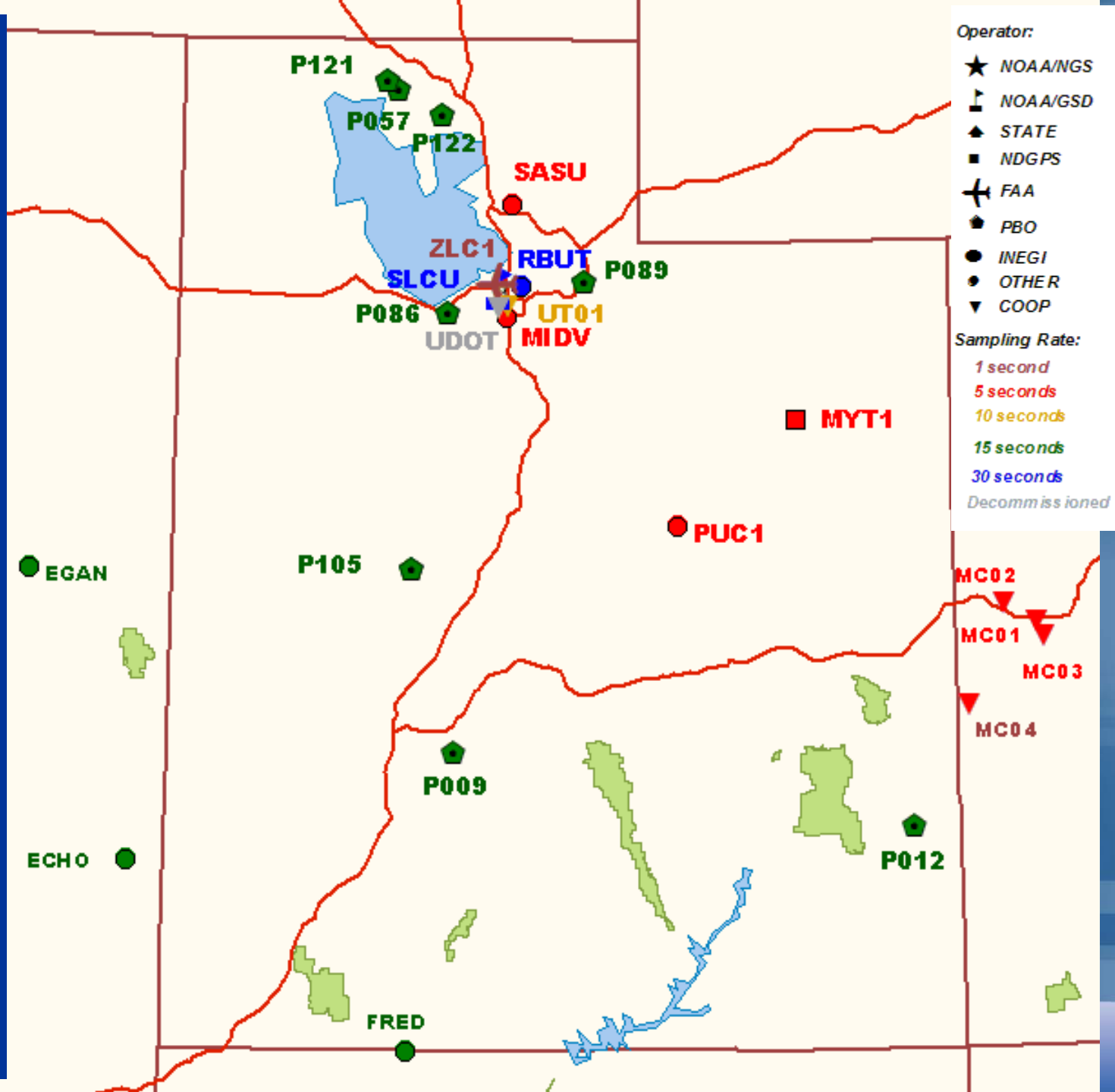
PUC1

Weber County

SASU

Transit Instrs.

(COOP) UT01





National
Geodetic
Survey



Products/Services

National and Cooperative CORS

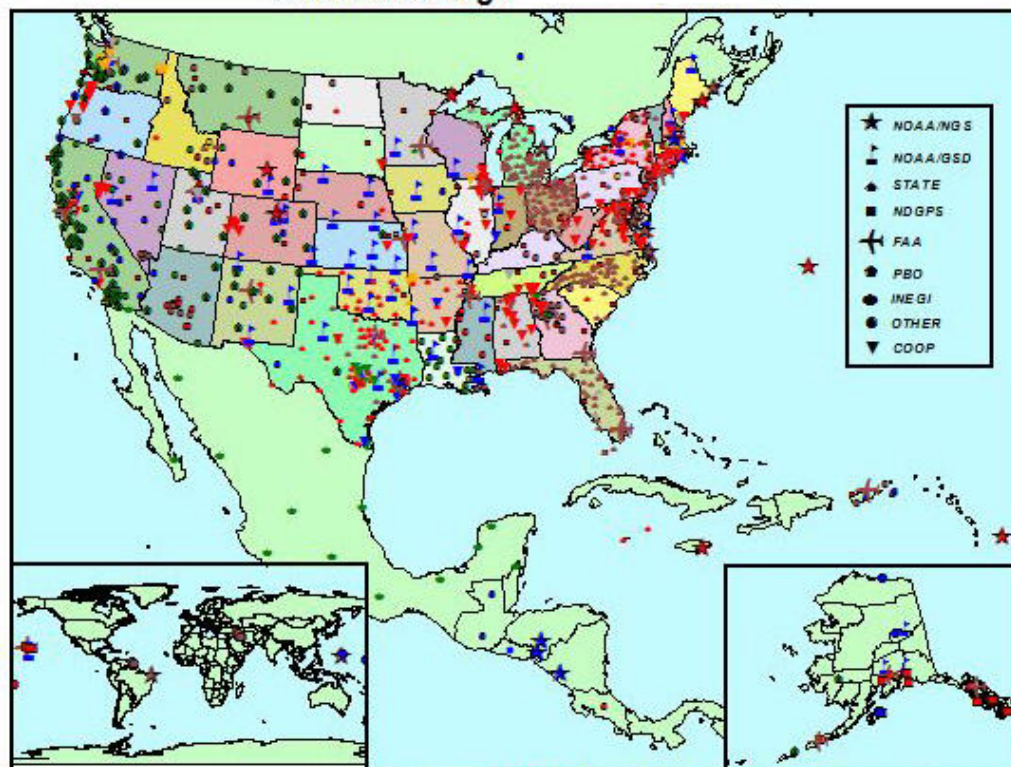
[Data Sheets](#)

[Search](#)

[opus](#) | [coop cors](#) | [map](#) | [newsletter](#) | [standard download](#) | [ufcors](#) | [coordinates](#)
[CORS ftp in Silver Spring, MD](#) | [CORS ftp in Boulder, CO](#)

Enter SiteID

CORS Coverage



Symbol color denotes sampling rates:(1 sec)(5 sec)(10 sec)(15 sec)(30 sec)Decommissioned

[Newsletter](#)

[Downloads](#)

[Site Metadata](#)

[General Information](#)

[Cooperative CORS](#)

[California CORS](#)

[Instructions](#)

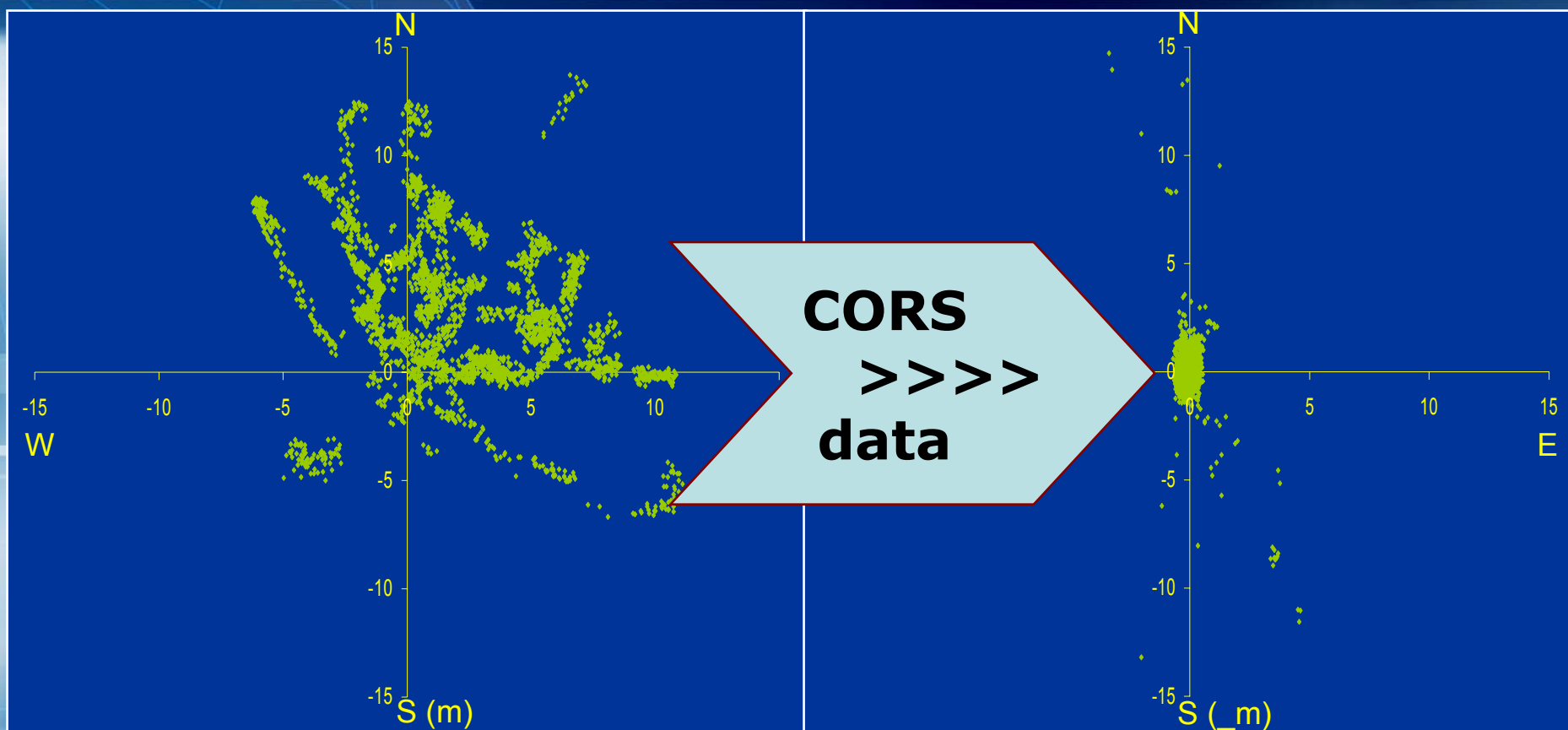
[GPS Links](#)

[Utilities](#)

[CORS Home](#)

[Contact Us](#)

NATIONAL GEODETIC SURVEY



autonomous

corrected



National Oceanic and Atmospheric Administration

KYCB: Daily minus Published ITRF00 Position

$N(\text{cm}) = 0.25 (+/-0.20)$ $E(\text{cm}) = 0.35 (+/-0.26)$ $U(\text{cm}) = 0.17 (+/-0.88)$

CORS 60-Day Plot

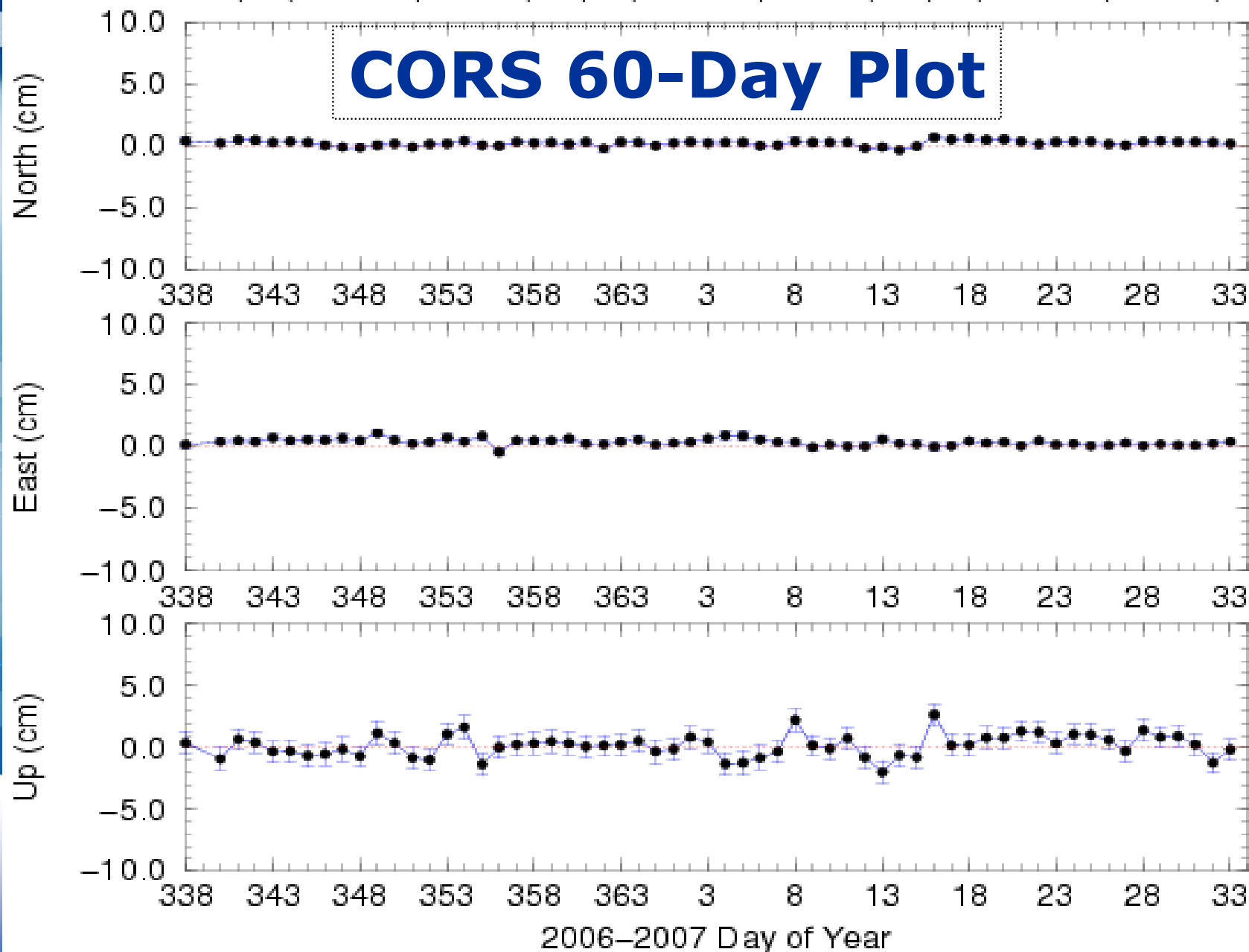
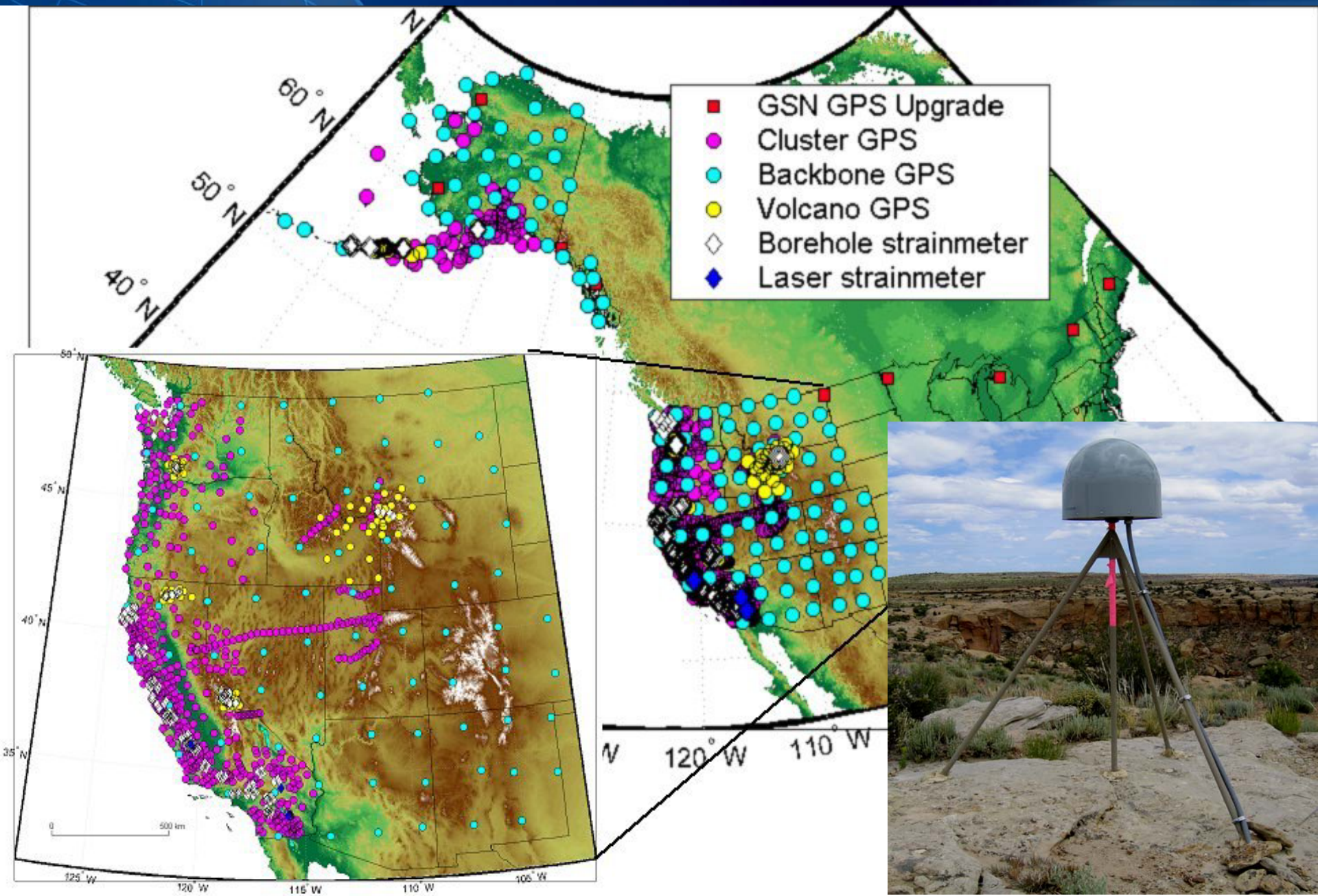
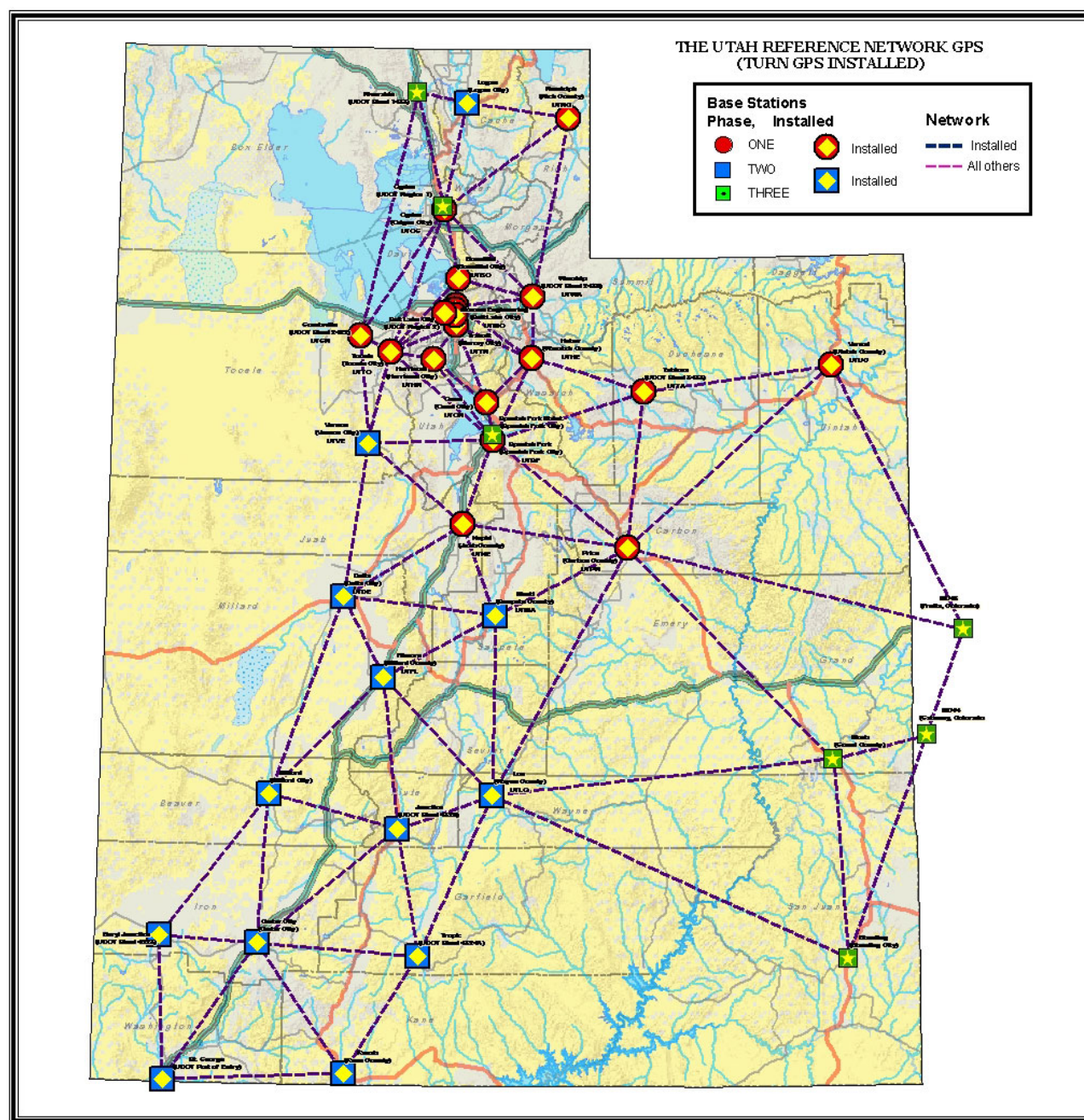


Plate Boundary Observatory



The Utah Reference Network GPS (TURN GPS)





National Geodetic Survey - CORS



[National CORS](#) | [Cooperative CORS](#) | [Antennas](#) | [Questions/Comments](#)

NEW and OFFICIAL
[Guidelines for Establishing and Operating CORS - 2006 Feb 26](#)

Joining the Continuously Operating Reference Station (CORS) Network For BOTH National and Cooperative CORS

[Orienting/Leveling Devices](#)
[Required Receiver and Antenna Codes](#)
[NGS Station Log Checker](#) (updated Nov 20, 2007 - please give us feedback)

Guidelines for New and Existing Continuously Operating Reference Stations (CORS)

**National Geodetic Survey
National Ocean Survey, NOAA
Silver Spring, MD 20910
February 2006**



National Oceanic and Atmospheric Administration

Online Positioning User Service (OPUS)

NATIONAL GEODETIC SURVEY



Online Positioning User Service

OPUS Upload | [What is OPUS](#) | [Using OPUS](#) | [Recent Solutions](#) | [Flags](#) | [Privacy Policy](#) | [OPUS Policies](#) | [Contact OPUS](#)

For those of you that have shorter data-sets, please try [OPUS Rapid Static](#).

1.
Enter your [email address](#)
2.
Enter your [DATA file](#) Now accepting RINEX and selected receiver formats.
Data files may also be compressed (.ZIP, .zip, .Z, .gz)
3.
Select the [antenna type](#)
4. meters
Enter the [antenna height](#)
5.
If desired, select from several options to modify the basic OPUS procedures.

Your data must be dual frequency data (L1 and L2) and a minimum of 2 hours of observations is recommended.
Your collection rate must be 1,2,3,5,10,15 or 30 seconds.
OPUS declimates all data to a 30 second rate.

[What is OPUS](#)

[Using OPUS](#)

[Recent Solutions](#)

[FAQs](#)

[OPUS Policies](#)

[OPUS - RS](#)

[Contact OPUS](#)

Recent Developments

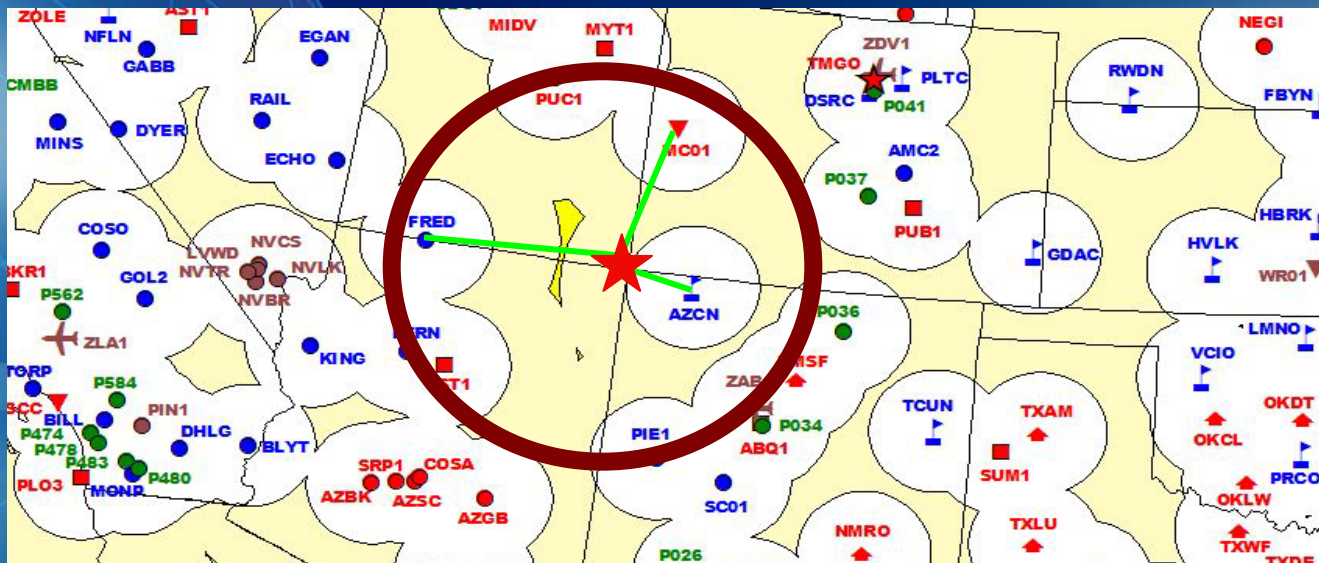
[Aug 22, 2007]
Now offering
XML output on
OPUS Options
page
[Jul 3, 2007]
Have you



National Oceanic and Atmospheric Administration

Online Positioning User Service (OPUS)

NATIONAL GEODETIC SURVEY



- Submit GPS data to OPUS Web site
- Processed automatically on NGS computers
- Uses 3 CORS; up to 9 CORS (OPUS-RS)
- Solution via email - in minutes
- Fast, easy, consistent access to NSRS –
“Datasheet of the Future” (Peter Lazio)



Online Positioning User Service



OPUS Upload | [What is OPUS](#) | [Using OPUS](#) | [FaqS OPUS](#) | [Recent Solutions](#) | [What is OPUS-RS](#) | [Using OPUS-RS](#) | [FaqS OPUS-RS](#) | [Privacy Policy](#) | [OPUS Policies](#) | [e-mail](#)

What is OPUS

Using OPUS

Recent Solutions

FAQs

FAQs - OPUS-RS

OPUS Policies

Contact OPUS

Recent Developments

[Feb 10, 2008] ↑
OPUS-RS now
using version
1.19, rsgps
1.19
[Dec 5,
2007] ↓

1.

Enter your [email address](#)

2.

Enter your [DATA file](#) Now accepting RINEX and selected receiver formats.
Data files may also be compressed (.ZIP, .zip, .Z, .gz)

3.

Select the [antenna type](#)

4. meters

Enter the [antenna height](#)

5.

If desired, select from several options to modify the basic OPUS

Your data must be dual frequency (L1 and L2), contain at least 2 hours of observations and have a collection rate of 1,2,3,5,10,15 or 30 seconds.

Your data must be dual frequency (L1 and L2), contain between 15 minutes and 4 hours of observations and have a collection rate of 1,2,3,5,10,15 or 30 seconds.

observation
file

antenna type

options

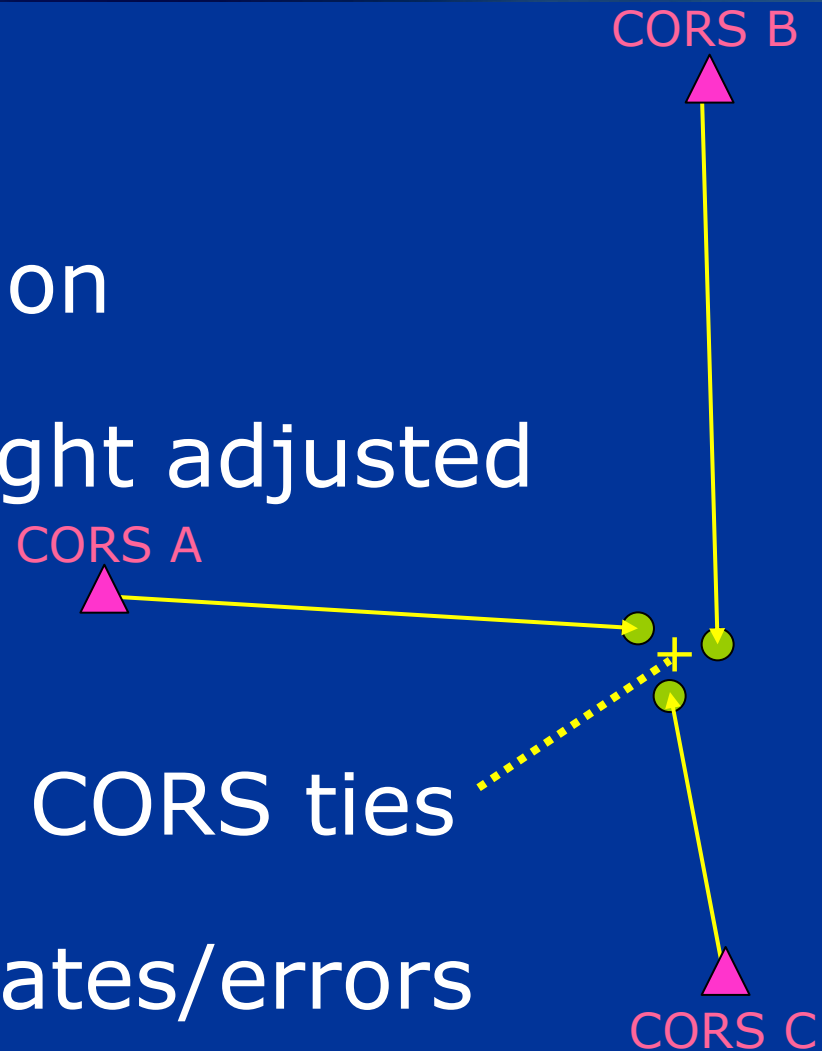
antenna
height

OPUS
(2 hr)
OPUS-RS
(15 min)

How are OPUS Positions Computed?

NATIONAL GEODETIC SURVEY

- Ionospheric-free solution
- Tropospheric scale height adjusted
- Fixed ambiguities
- Average of 3-9 unique CORS ties
- ITRF & NAD83 coordinates/errors



NGS OPUS SOLUTION REPORT

=====

USER: william.stone@noaa.gov
RINEX FILE: satt142p.03o

DATE: January 23, 2006
TIME: 19:07:03 UTC

SOFTWARE: page5 0601.10 master24.pl
EPHEMERIS: igs12194.eph [precise]
NAV FILE: brdc1420.03n
ANT NAME: ASH701975.01B NONE
ARP HEIGHT: 2.0

START: 2003/05/22 15:45:00
STOP: 2003/05/22 18:00:00
OBS USED: 5443 / 5491 : 99%
FIXED AMB: 27 / 27 : 100%
OVERALL RMS: 0.011(m)

REF FRAME: NAD_83(CORS96)(EPOCH:2002.0000)

ITRF00 (EPOCH:2003.3882)

X:	-1483421.741(m)	0.011(m)	-1483422.387(m)	0.011(m)
Y:	-5020822.786(m)	0.018(m)	-5020821.428(m)	0.018(m)
Z:	3633944.541(m)	0.011(m)	3633944.453(m)	0.011(m)

LAT:	34 56 43.60684	0.005(m)	34 56 43.62530	0.005(m)
E LON:	253 32 24.06657	0.005(m)	253 32 24.02700	0.005(m)
W LON:	106 27 35.93343	0.005(m)	106 27 35.97300	0.005(m)
EL HGT:	1810.320(m)	0.023(m)	1809.352(m)	0.023(m)
ORTHO HGT:	1830.434(m)	0.034(m)	[Geoid03 NAVD88]	

UTM COORDINATES

UTM (Zone 13)

STATE PLANE COORDINATES

SPC (3002 NM C)

Northing (Y) [meters]	3867966.366	437542.766
Easting (X) [meters]	366680.908	480820.362
Convergence [degrees]	-0.83639519	-0.12027698
Point Scale	0.99981906	0.99990453
Combined Factor	0.99953503	0.99962048

US NATIONAL GRID DESIGNATOR: 13SCU6668167966(NAD 83)

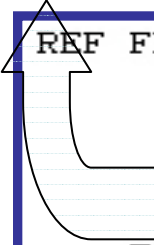
BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DG5392	SC01 NMT SOCORRO CORS ARP	N340404.613	W1065759.511	107917.9
DE8222	ABQ1 ALBUQUERQUE USCG1 CORS ARP	N345726.546	W1062940.038	3417.8
DF4369	NMSF SANTA FE CORS ARP	N354025.623	W1055730.931	92811.5

NEAREST NGS PUBLISHED CONTROL POINT

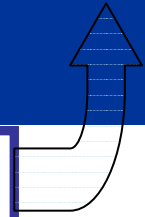
EQ0111	SATELLITE TRI STA 110	N345643.606	W1062735.933	0.0
--------	-----------------------	-------------	--------------	-----

- NAD83 & ITRF solutions – X,Y,Z & lat/long/height
- Orthometric height – derived from geoid model
- Error estimates



REF FRAME:	NAD_83(CORS96) (EPOCH:2002.0000)		ITRF00 (EPOCH:2003.3882)	
X:	-1483421.741(m)	0.011(m)	-1483422.387(m)	0.011(m)
Y:	-5020822.786(m)	0.018(m)	-5020821.428(m)	0.018(m)
Z:	3633944.541(m)	0.011(m)	3633944.453(m)	0.011(m)
LAT:	34 56 43.60684	0.005(m)	34 56 43.62530	0.005(m)
E LON:	253 32 24.06657	0.005(m)	253 32 24.02700	0.005(m)
W LON:	106 27 35.93343	0.005(m)	106 27 35.97300	0.005(m)
EL HGT:	1810.320(m)	0.023(m)	1809.352(m)	0.023(m)
ORTHO HGT:	1830.434(m)	0.034(m)	[Geoid03 NAVD88]	

- NAD83 UTM & SPCS:
 - Easting/Northing
 - Convergence
 - Point scale factor
 - Combined scale factor(SPC in feet may be available in Extended Output)
- US National Grid Designator



	UTM COORDINATES	STATE PLANE COORDINATES
	UTM (Zone 13)	SPC (3002 NM C)
Northing (Y) [meters]	3867966.366	437542.766
Easting (X) [meters]	366680.908	480820.362
Convergence [degrees]	-0.83639519	-0.12027698
Point Scale	0.99981906	0.99990453
Combined Factor	0.99953503	0.99962048

US NATIONAL GRID DESIGNATOR: 13SCU6668167966(NAD 83)



Online Positioning User Service



NATIONAL GEODETIC SURVEY

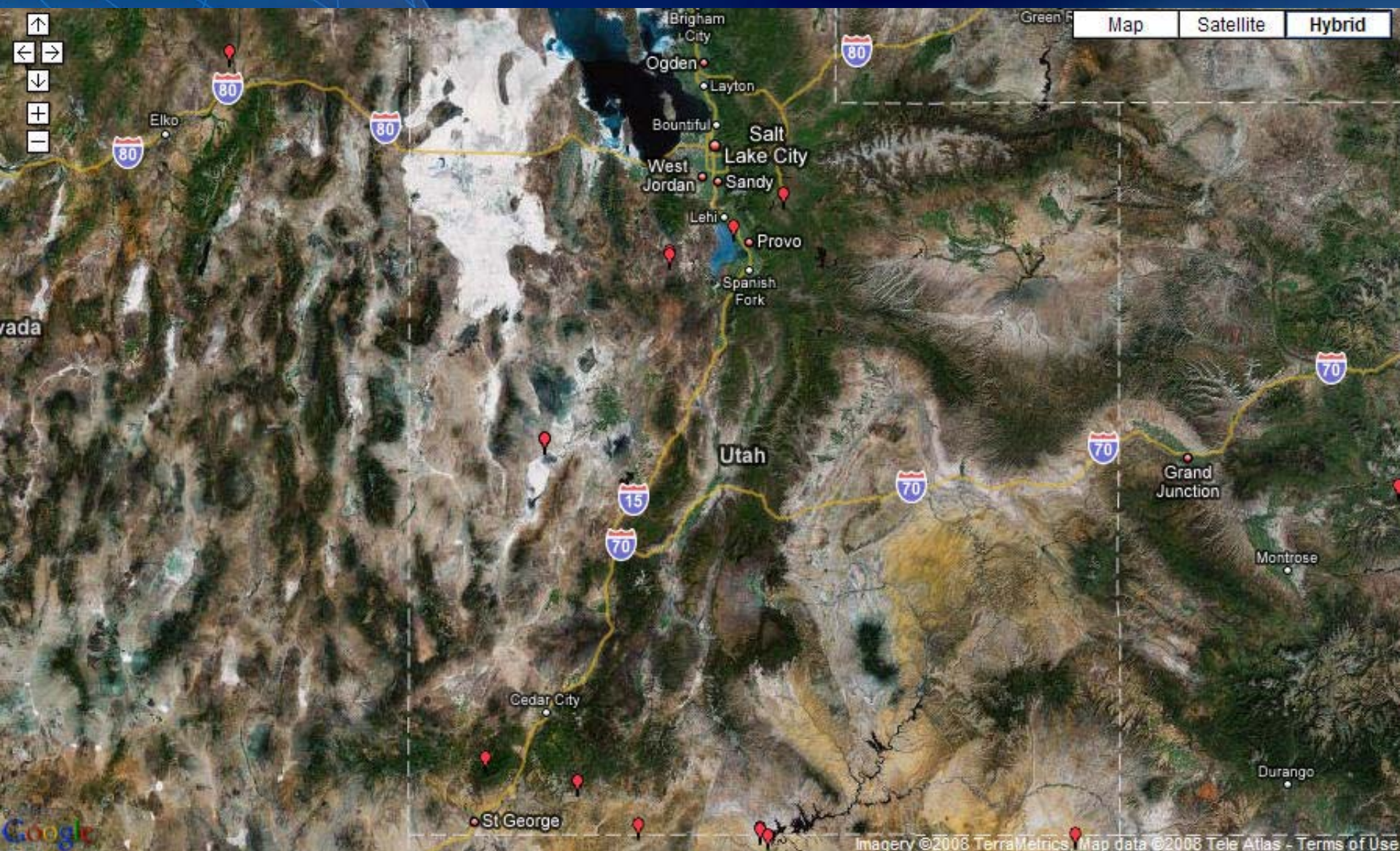




Online Positioning User Service



NATIONAL GEODETIC SURVEY





Online Positioning User Service



NATIONAL GEODETIC SURVEY



Map Satellite Hybrid

Pine Valley



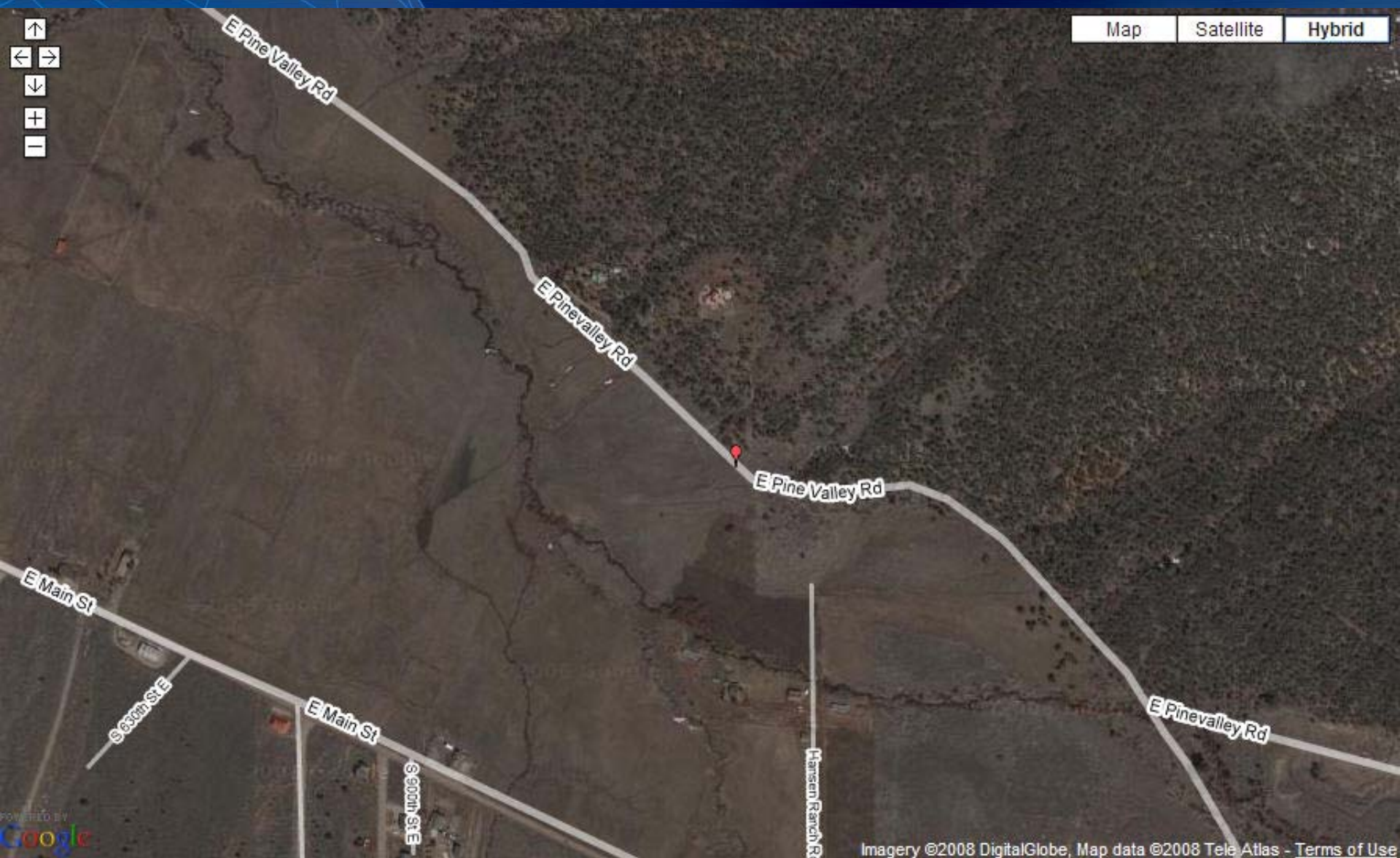
Online Positioning User Service



NATIONAL GEODETIC SURVEY



Map Satellite Hybrid

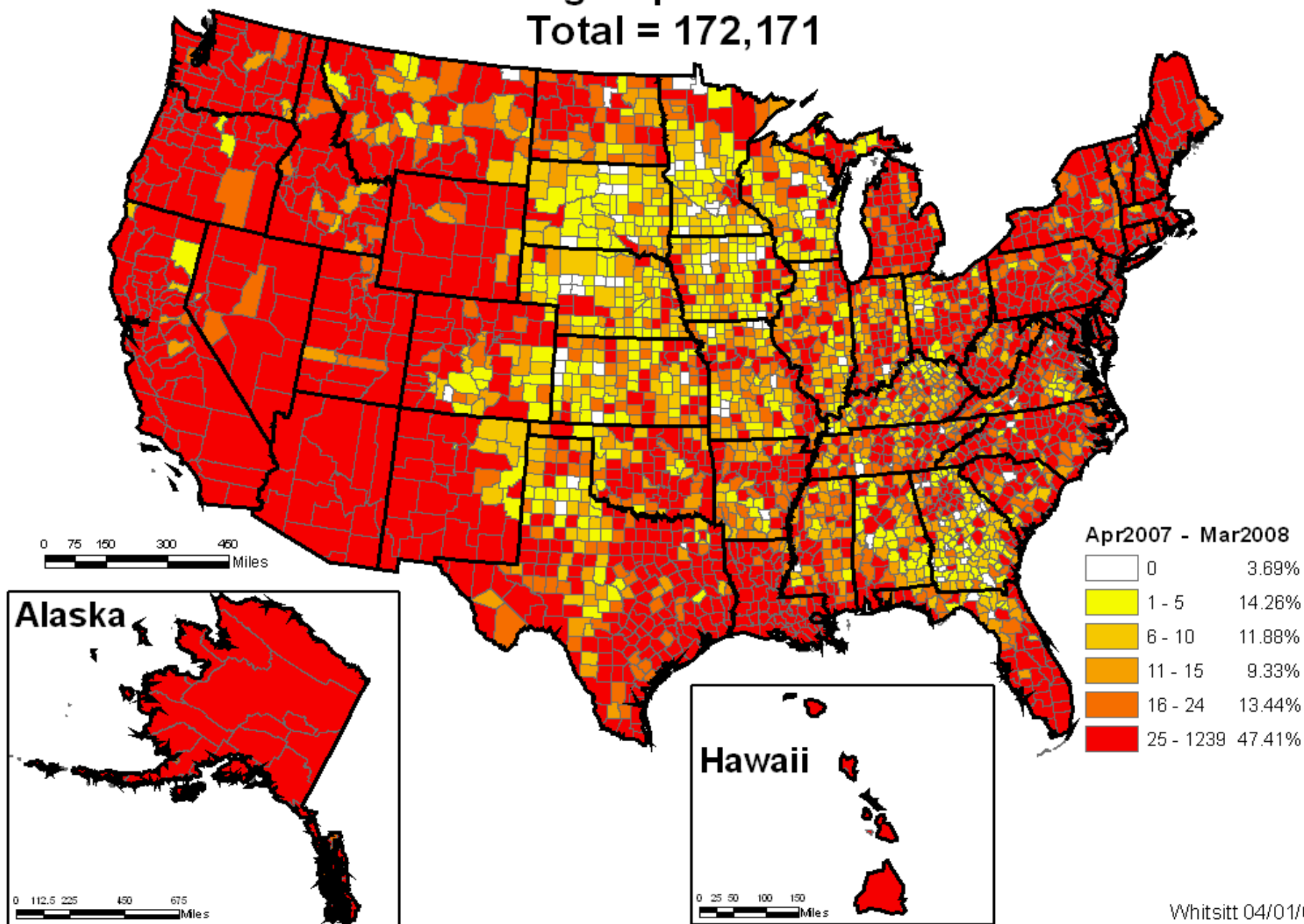


POWERED BY
Google

Imagery ©2008 DigitalGlobe, Map data ©2008 Tele Atlas - [Terms of Use](#)

OPUS Usage Apr2007 - Mar2008

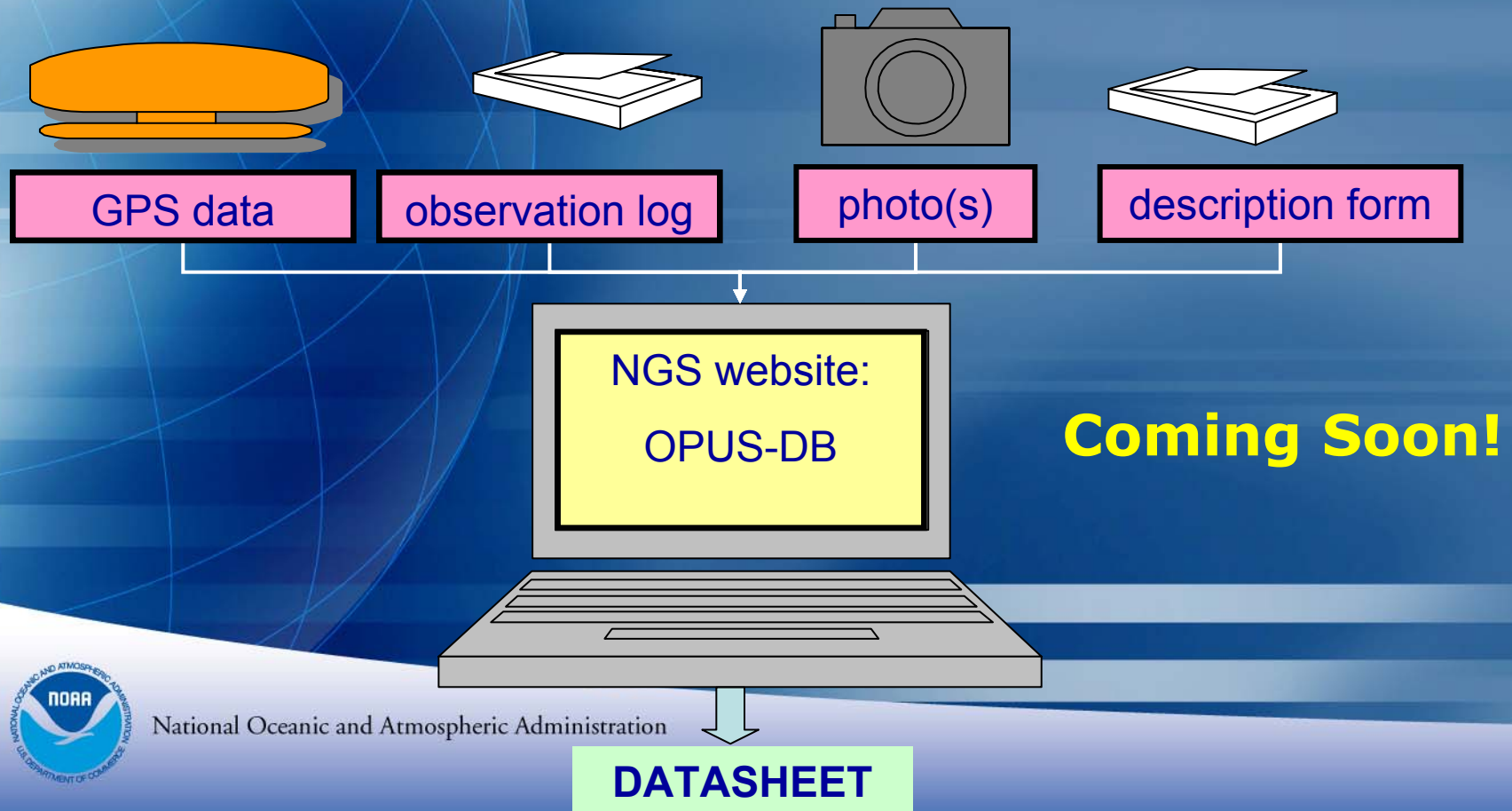
Total = 172,171



OPUS-Database (OPUS-DB)

NATIONAL GEODETIC SURVEY

- streamlined method for users to publish their results
- user registration –ID/password & validation process
- submission review by user and NGS



OPUS-Projects

- project planning / monitoring
- automated file management
- review repeat measurements
- network adjustment
- publish in NGS database

**Under
Construction**

1. Select a Session => 2. Designate Stations => 2a. Fix Station

Click a session to display stations at

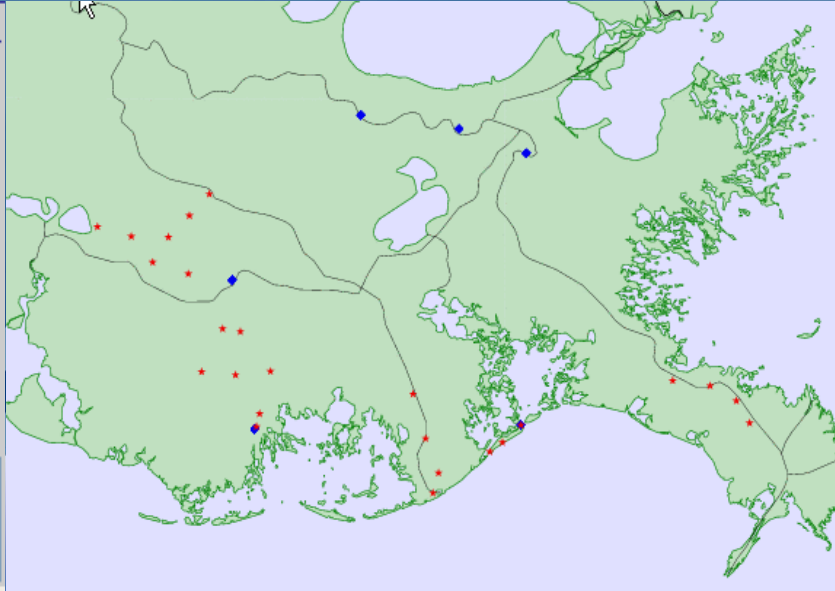
Use +/- buttons to designate right. FIX, HUB & OMIT

Choose a Station

2b. Hub Stations

2c. Omit Stations

3. Click PROCESS

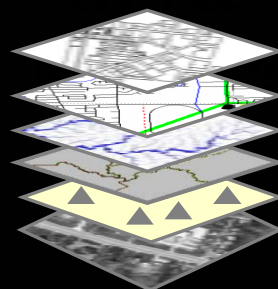


The interface shows a list of sessions on the left, a list of stations in the center, and three sections for designating station types (Fix, Hub, Omit) on the right. A map on the far right displays the geographic distribution of these stations in the Pacific Northwest region. The 'Fix Station' section includes a 'covg' button. The 'Hub Stations' section includes buttons for 'gode', 'mdo1', and 'nlib'. The 'Omit Stations' section includes a button for '2223274u'.

OPUS-Mapper

NATIONAL GEODETIC SURVEY

- range solutions
- single frequency observations
- kinematic trajectories computed
- accuracy appropriate for mapping/GIS
- generate shapefiles



**Under
Construction**



National Oceanic and Atmospheric Administration

NAD83 Evolution - 2007 Readjustment

NATIONAL GEODETIC SURVEY

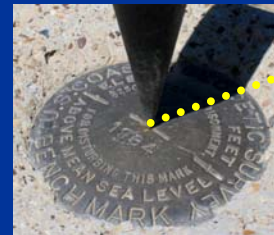
- Original NAD83 Adjustment
nationwide
1986



- High Accuracy Reference Networks
state-by-state
1987-1997



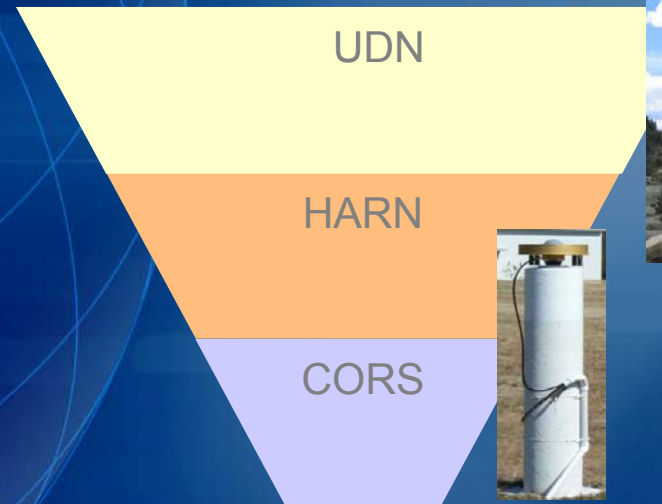
- Height Modernization / Federal Base Network
state-by-state
1997-2003
CORS ties



The National NAD83 Readjustment

NATIONAL GEODETIC SURVEY

- Completed February 10, 2007 (NGS' 200th birthday)
- CORS provided the control/constraints
- Federal/Coop Base Networks (HARN) tied to CORS
- User Densification Network tied to HARN



GPS projects only –

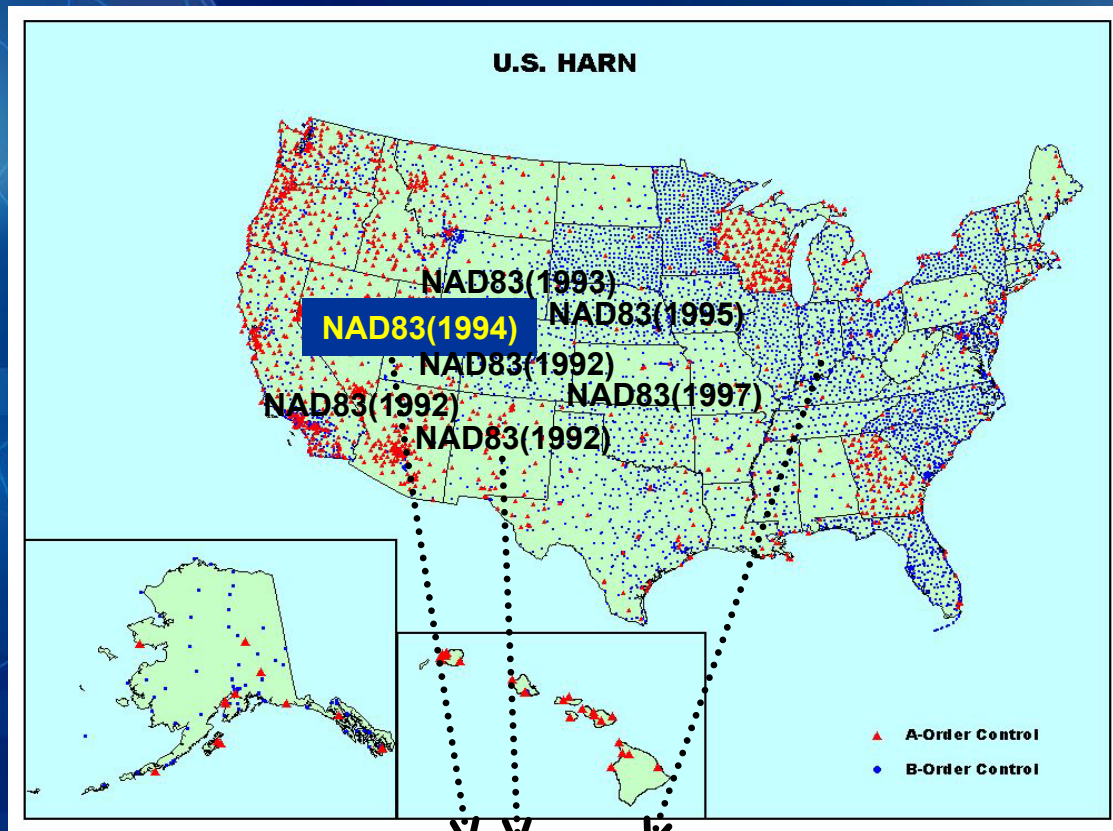
**> 300,000 vectors
> 67,000 stations**



National Oceanic and Atmospheric Administration

NAD83 Readjustment

NATIONAL GEODETIC SURVEY

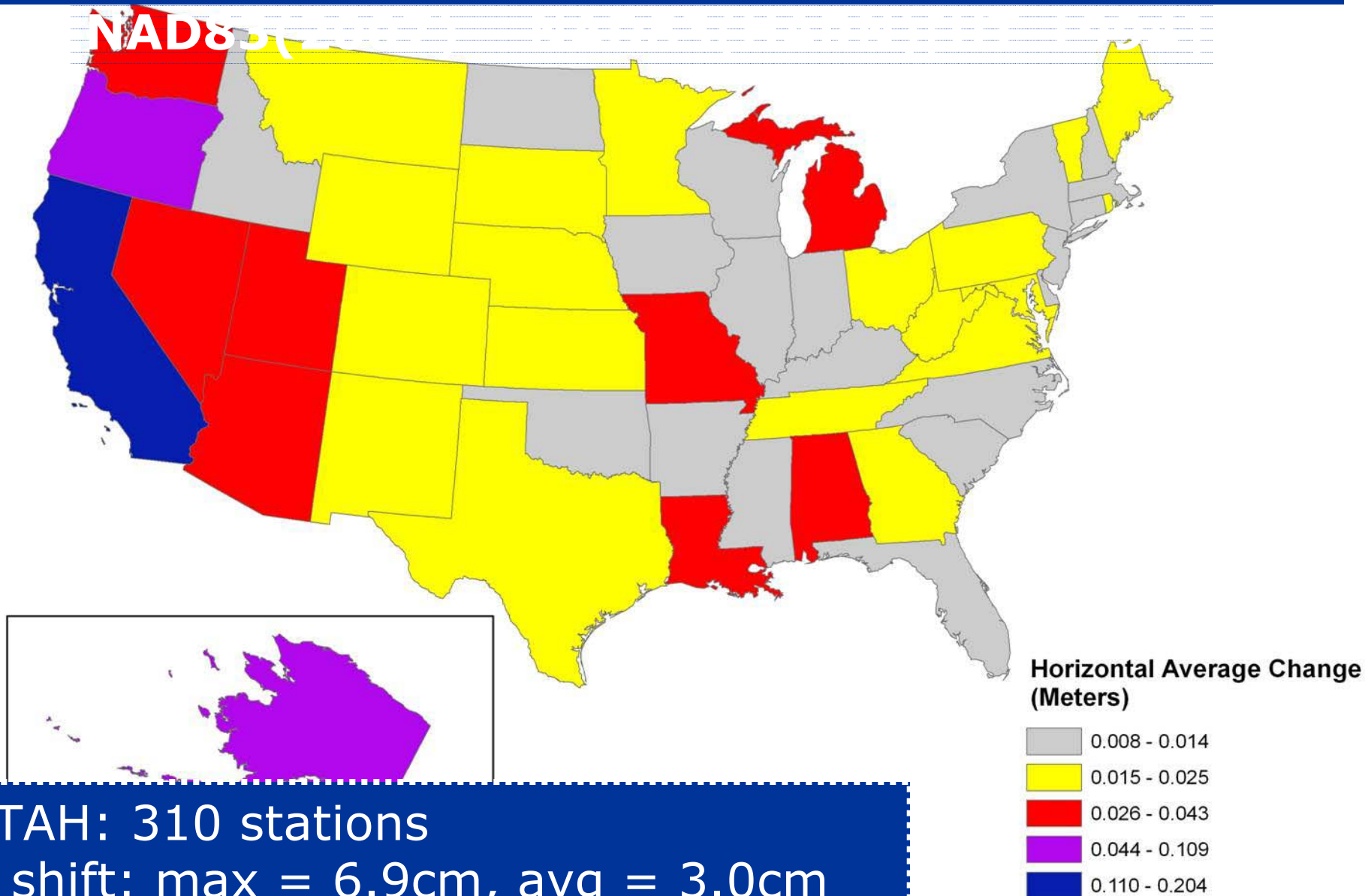


NAD83 (2007)
nationwide



National Oceanic and Atmospheric Administration

NAD83 Readjustment Coordinate Shifts



UTAH: 310 stations

H shift: max = 6.9cm, avg = 3.0cm

V shift: max = 15.9cm, avg = 1.9cm

Produced February 12, 2007

NAD83(2007) Datasheet

NATIONAL

```

HO0523 *****
HO0523 CBN - This is a Cooperative Base Network Control Station.
HO0523 DESIGNATION - BRYCE
HO0523 PID - HO0523
HO0523 STATE/COUNTY- UT/GARFIELD
HO0523 USGS QUAD - BRYCE CANYON (1966)
HO0523
HO0523 *CURRENT SURVEY CONTROL
HO0523
HO0523 * NAD 83(2007)- 37 42 14.14393(N) 112 09 13.83347(W) ADJUSTED
HO0523 * NAVD 88 - 2328.8 (meters) 7640. (feet) GPS OBS
HO0523
HO0523 EPOCH DATE - 2002.00
HO0523 X - -1,905,995.760 (meters) COMP
HO0523 Y - -4,681,276.616 (meters) COMP
HO0523 Z - 3,880,908.208 (meters) COMP
HO0523 LAPLACE CORR- 0.12 (seconds) DEFLEC99
HO0523 ELLIP HEIGHT- 2308.811 (meters) (02/10/07) ADJUSTED
HO0523 GEOID HEIGHT- -19.95 (meters) GEOID03
HO0523
HO0523 ----- Accuracy Estimates (at 95% Confidence Level in cm) -----
HO0523 Type PID Designation North East Ellip
HO0523 -----
HO0523 NETWORK HO0523 BRYCE 0.59 0.43 1.20
HO0523 -----
HO0523
HO0523 The horizontal coordinates were established by GPS observations
HO0523 and adjusted by the National Geodetic Survey in February 2007.
HO0523
HO0523 The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
HO0523 See National Readjustment for more information.
HO0523 The horizontal coordinates are valid at the epoch date displayed above.
HO0523 The epoch date for horizontal control is a decimal equivalence
HO0523 of Year/Month/Day.
HO0523
HO0523 The orthometric height was determined by GPS observations and a
HO0523 high-resolution geoid model.
  
```



NAD83(2007) Datasheet

NATIONAL

HO0523;	North	East	Units	Scale Factor	Converg.
HO0523;SPC UT S	- 3,115,320.276	442,344.499	MT	0.99995227	-0 24 02.2
HO0523;UTM 12	- 4,173,592.544	398,288.025	MT	0.99972742	-0 42 20.6
HO0523					
HO0523!	- Elev Factor	x Scale Factor	=	Combined Factor	
HO0523!SPC UT S	- 0.99963783	x 0.99995227	=	0.99959012	
HO0523!UTM 12	- 0.99963783	x 0.99972742	=	0.99936535	
HO0523					
HO0523:	Primary Azimuth Mark			Grid Az	
HO0523:SPC UT S	- VAT 2			083 19 05.8	
HO0523:UTM 12	- VAT 2			083 37 24.2	
HO0523					
HO0523	-----				
HO0523	PID	Reference Object	Distance	Geod. Az	
HO0523				ddmmss.s	
HO0523	HO0517	VAT 2	APPROX. 6.7 KM	0825503.6	
HO0523	CH2805	BRYCE RM 2	11.167 METERS	09230	
HO0523	AA3663	BRYCE AZ MK 2	APPROX. 0.6 KM	2060528.2	
HO0523	CH2804	BRYCE RM 1	16.265 METERS	35633	
HO0523	-----				
HO0523					
HO0523	SUPERSEDED SURVEY CONTROL				
HO0523					
HO0523	ELLIP H (11/14/01)	2308.816 (m)	GP () 4 2	
HO0523	NAD 83(1994)-	37 42 14.14313(N)	112 09 13.83188(W)	AD () B
HO0523	ELLIP H (04/21/95)	2308.900 (m)	GP () 4 1	
HO0523	NAD 83(1986)-	37 42 14.14074(N)	112 09 13.84081(W)	AD () 2
HO0523	NAD 27	- 37 42 14.20545(N)	112 09 11.13670(W)	AD () 2
HO0523	NGVD 29 (07/19/86)	2327.4 (m)	7636. (f)	VERT ANG	
HO0523					
HO0523	Superseded values are not recommended for survey control.				
HO0523	NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.				
HO0523	See file dsdata.txt to determine how the superseded data were derived.				
HO0523					
HO0523	U.S. NATIONAL GRID SPATIAL ADDRESS: 12SUG9828873593(NAD 83)				
HO0523	MARKER: DD = SURVEY DISK				

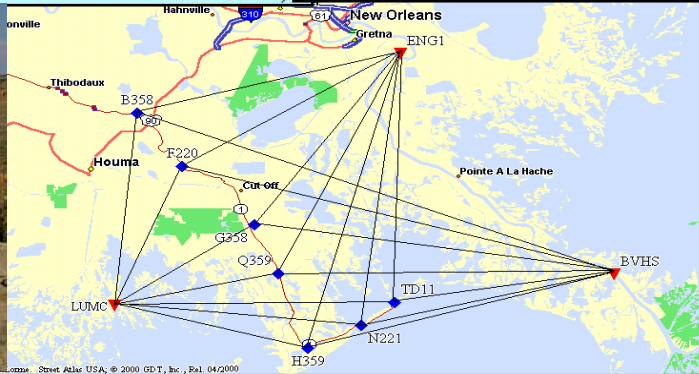
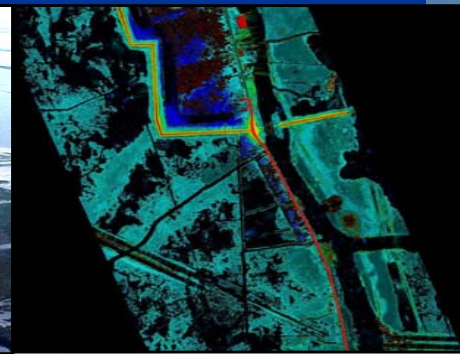
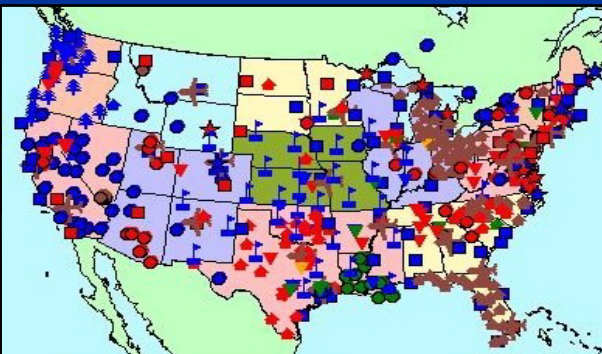


Height Modernization is ...

NATIONAL GEODETIC SURVEY

establishment of accurate, reliable elevations using:

- GPS technology
- conventional surveying (differential leveling)
- gravity measurements
- remote sensing (LiDAR)





differential leveling

**Height
Modernization**

- faster
- cheaper
- as good



GPS + ...

Height Modernization is ...

NATIONAL GEODETIC SURVEY

- Technical
 - standards & specifications
 - geodetic infrastructure
 - height modernization projects
- Organizational
 - stakeholders
 - federal funding/grants for state activities
 - program/project management
 - education

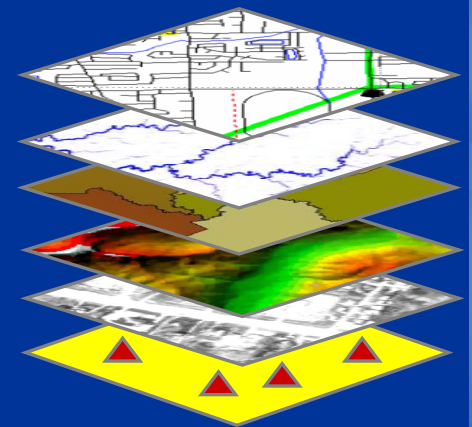


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Height Modernization Benefits

NATIONAL GEODETIC SURVEY

- BETTER ELEVATION DATA SUPPORTS:
 - Surveying
 - GIS/Mapping
 - LiDAR Surface Generation, Terrain Modeling
 - Floodplain Management
 - Construction
 - Engineering
 - Public Safety
 - Research
 - Aeronautical Navigation/Charting
 - Most Elevation Requirements



VERTICAL CONTROL

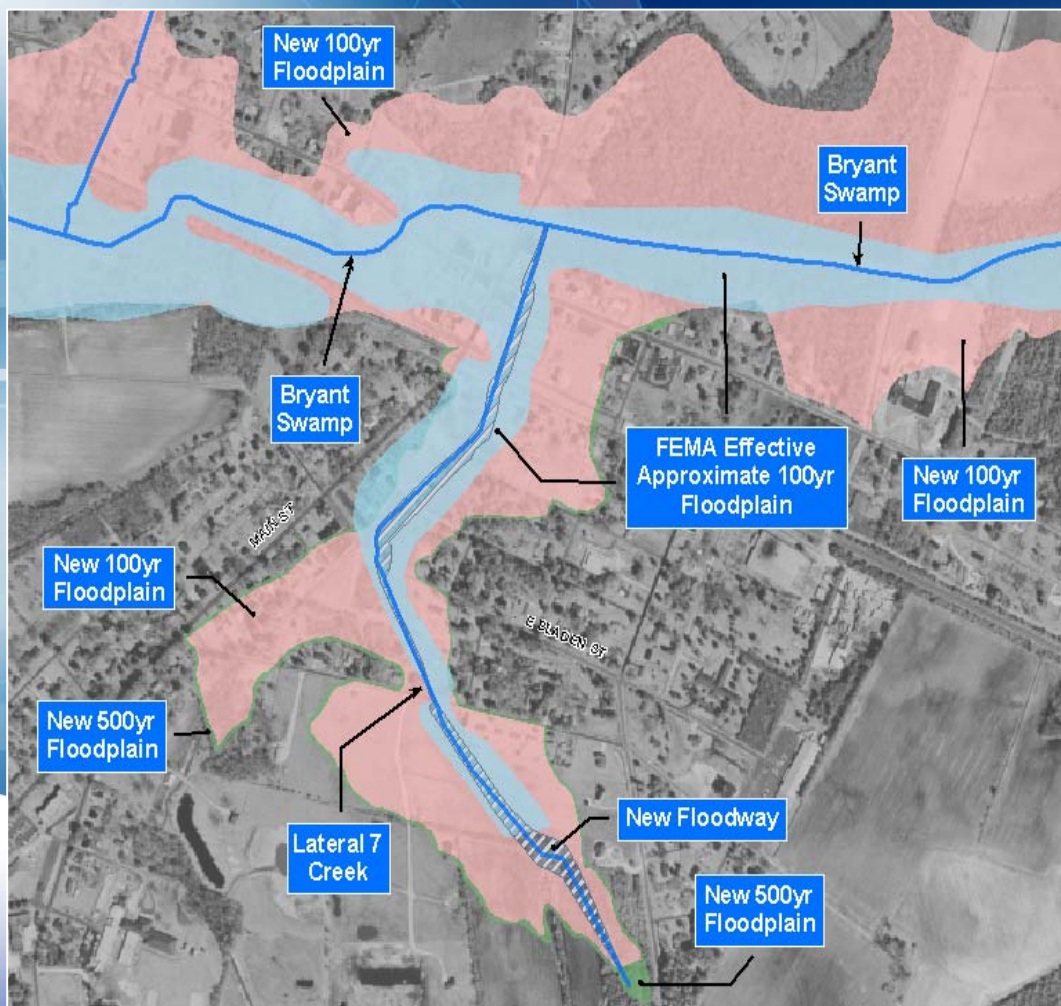


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Height Modernization is a key part of ...

NATIONAL GEODETIC SURVEY

FEMA's MAP Modernization



- Flood Insurance Risk Maps
- Elevation Certificates
- High Water Marks
- Dam Safety
- Flood Mitigation
- Drainage Planning
- Structure Repair



Height Modernization Appropriations

(FY01-FY07)

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BACKGROUND

Fiscal Year	Appropriations	States
FY 2001	\$2.25 M	CA, NC
FY 2002	\$3.75 M	CA, NC, LA, WI
FY 2003	\$3.75 M	CA, NC, LA, WI, MS
FY 2004	\$9.0 M	CA, NC, LA, WI, MS, AL, WA, SC
FY 2005	\$9.6 M	CA, NC, LA, WI, MS, AL, WA, TX, KY
FY 2006	\$9.9 M	CA, NC, WI, MS, AL, SC, TX, KY, AZ
FY 2007	\$9.9 M	CA, NC, WI, MS, AL, SC, TX, KY, AZ

Height Modernization Implementation Regions



Dominant Height Systems in the USA

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Requires Gravity

- **Orthometric**
 - Colloquially, but incorrectly, called “height above mean sea level”
 - On most topographic maps
 - Is a >99% successful method to tell which way water will flow
- **Ellipsoid**
 - Almost exclusively from GPS
 - Won't tell water flow / floodplains
- **Dynamic**
 - Directly proportional to potential *energy*: always tells which way water will flow
 - Dynamic heights are *not* lengths!



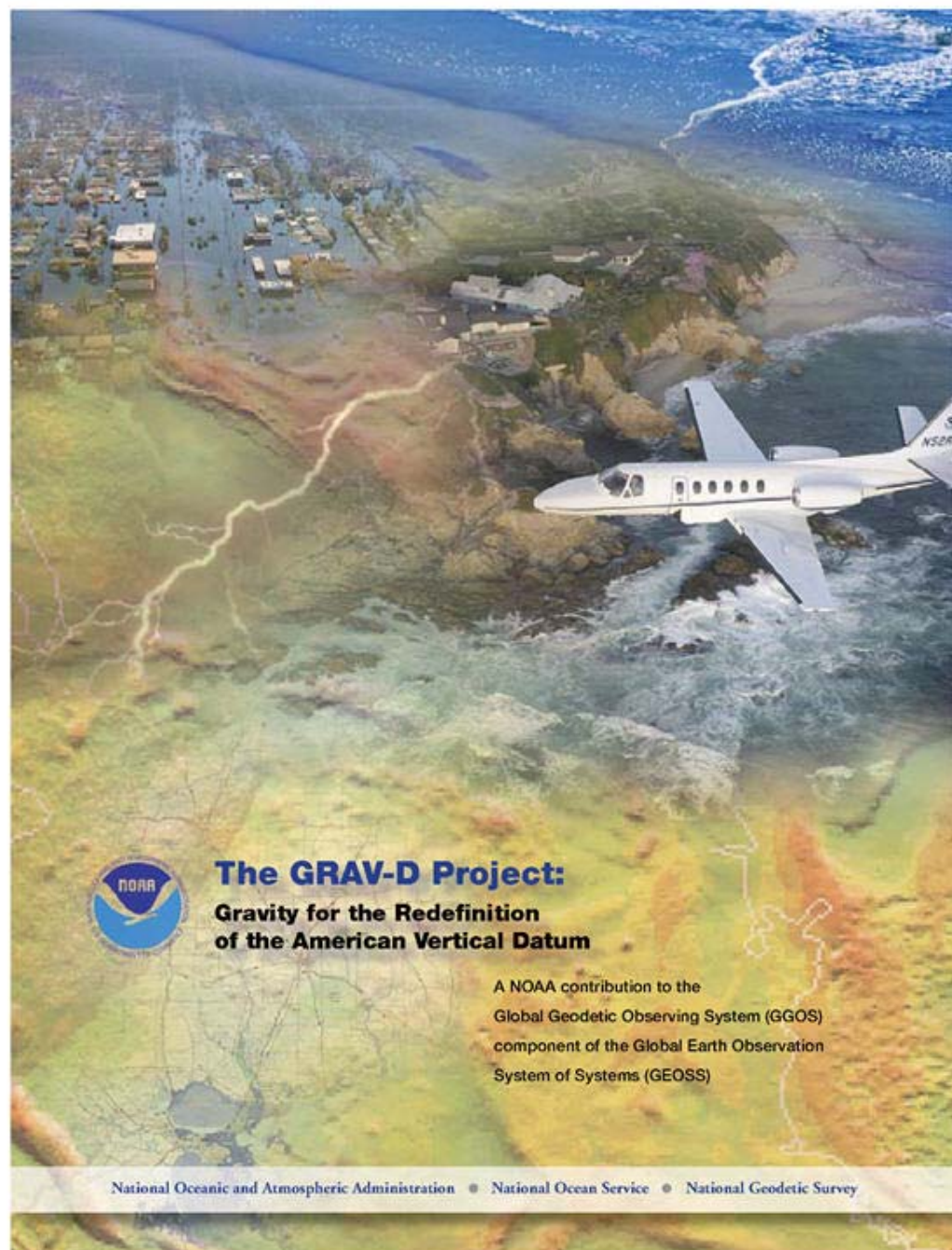
Requires Gravity



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GRAV-D Project: Gravity for the Redefinition of the American Vertical Datum

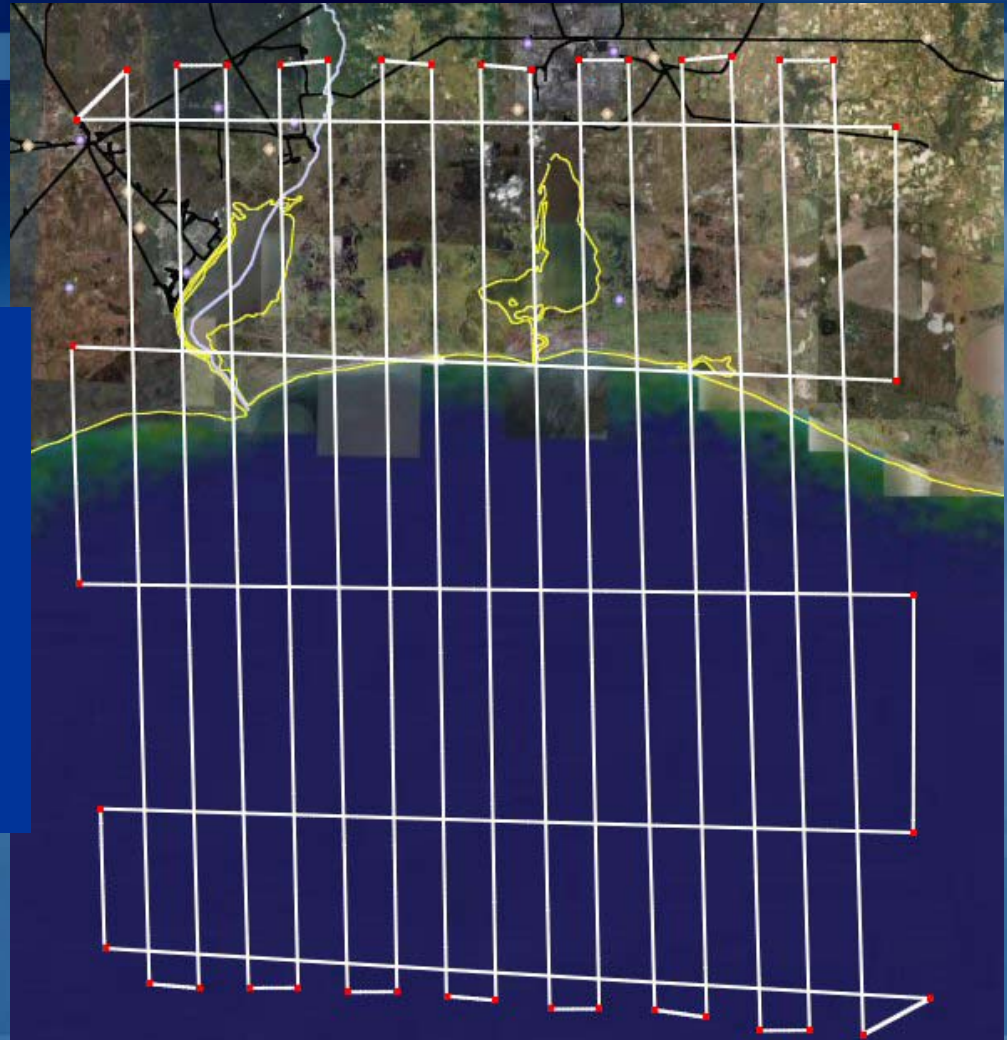
- ***NGS policy adopted
Nov 14, 2007***
 - ***\$38.5M over 10
years***
- ***Airborne Gravity
Snapshot***
- ***Absolute Gravity
Tracking***
- ***Re-define the Vertical
Datum of the USA by
2018***



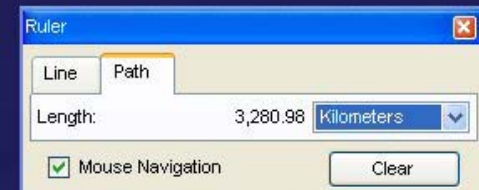
Proposed GRAV-D Flight Pattern

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- 10 km flight line spacing
- 40 km cross tracks
- 325 kt flight speed
- 35,000 ft flight altitude

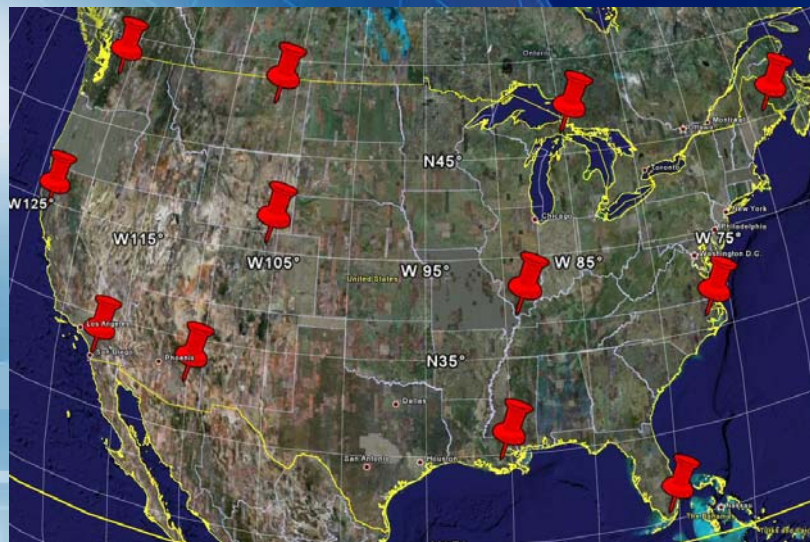


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Monitor Gravity (“Low Resolution Movie”)

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- Measure gravity at each point, annually
- Model gravity changes over time
- Convert to geoid changes over time
- Use with CORS to get orthometric height changes over time



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The National Geodetic Survey Ten-Year Plan

The mission of NGS is hereby understood to be:

1) To define, maintain and provide access to the **National Spatial Reference System** to meet our nation's economic, social, and environmental needs

and

2) To be a world leader in geospatial activities, including the development and promotion of **standards, specifications, and guidelines**.

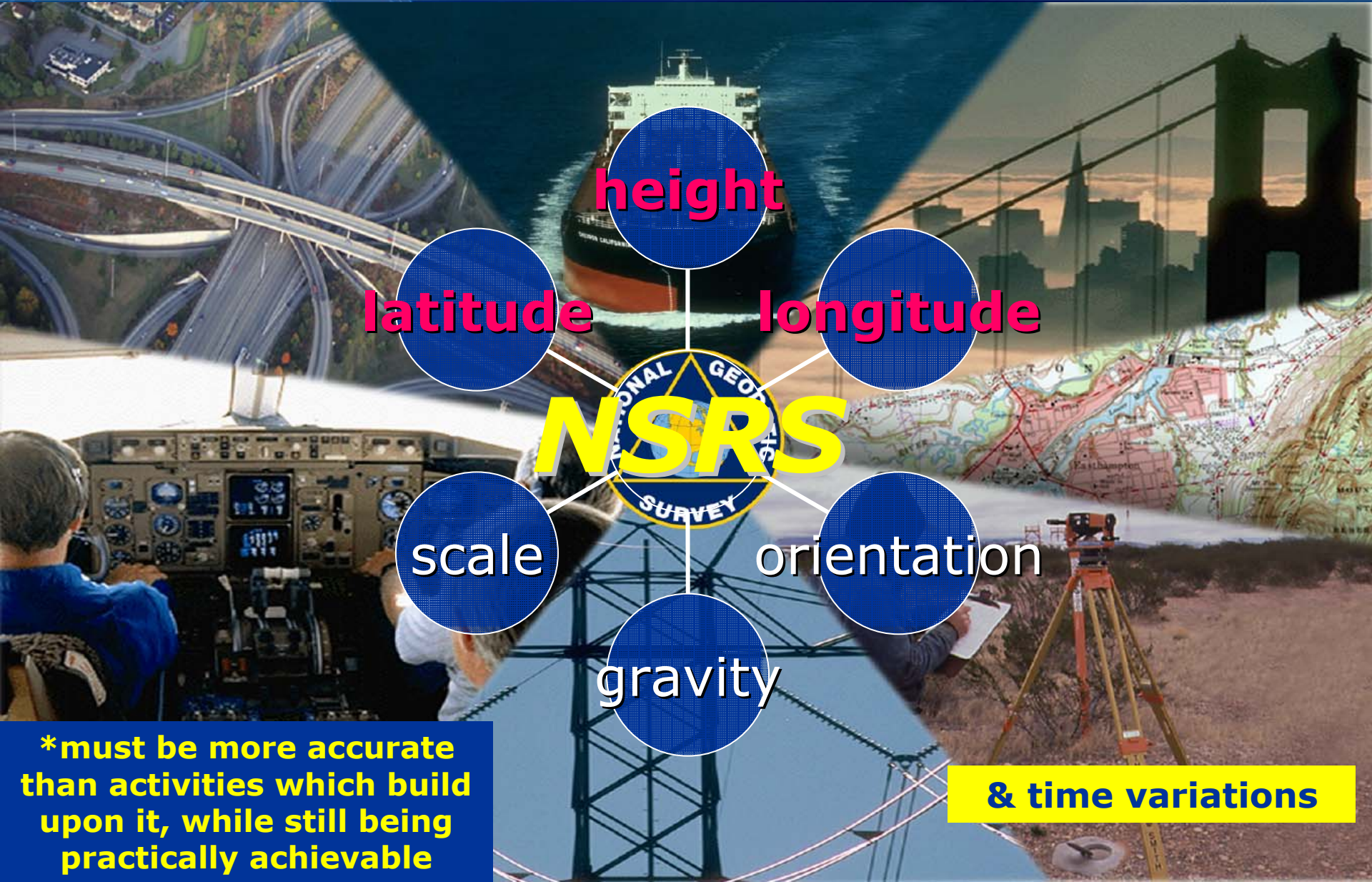


Mission, Vision and Strategy
2008-2018



National Spatial Reference System

NATIONAL GEODETIC SURVEY



***must be more accurate than activities which build upon it, while still being practically achievable**

& time variations

Achieving the Vision: 1 – Geometric Datum

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- **replace NAD83 with new geometric datum – by 2018**
- **coordinates & velocities in US datum and ITRF; provide relationships**
- **CORS-based, via GNSS**
- **lat/long/height of defining points accurate to 1 mm, anytime**
- **3-D coordinates of GNSS S/Vs @ 1 cm, anytime (<1 cm, after 1 week)**
- **passive control monuments tied to new datum**
 - » **but not a component of new datum**
- **CORS – 2 tiers: foundation (few) & all others (many)**
- **CORS coordinates computed & published daily – track changes with time**
- **modernize CORS sites and access tools as GNSS evolves**
- **support development of real-time networks**
- **address user needs of datum coordinate stability and accuracy**



Achieving the Vision: 2 – Geopotential Datum

NATIONAL GEODETIC SURVEY

- **replace NAVD88 with new geopotential datum – by 2018**
- **gravimetric geoid-based**
- **prove that 1 cm geoid is achievable (or why not)**
- **produce most accurate continental, gravimetric geoid model**
- **determine gravity with accuracy of 10 microGals**
- **North Pole to Equator; Attu Island to Newfoundland**
- **monitor time-varying nature of gravity field**
- **support both orthometric and dynamic heights**
- **develop transformation tools to relate to NAVD88**



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NAD83 State Plane Legislation

Letters of Request from:

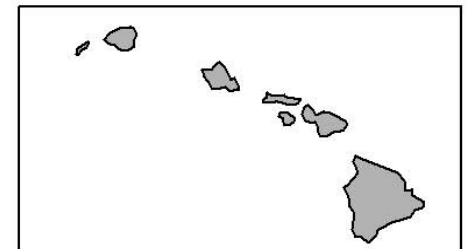
- UT Council of Land Surveyors
- UT Department of Transportation
- UT Automated Geographic Reference Center

International Foot = .3048 meters
US Survey Foot = 1200/3937 meters



International Foot = .3048 meters
US Survey Foot = 1200/3937 meters

 No NAD 83 Legislation
 Foot Conversion Not Defined
 International Feet Defined
 U.S. Survey Foot Defined



N.T.S

The "Scorecard" – Government Performance & Results Act (GPRA)

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- % of US counties rated as fully enabled or substantially enabled with accurate positioning capacity

Measure	FY 2004	2005	2006	Target				
	(baseline)			2007	2008	2009	2010	2011
Percentage of U.S. counties rated as substantially enabled or fully enabled with accurate positioning capacity	25%	28%	39%	49%	60%	75%	82%	92%



National Geodetic Survey State Advisors

